

REMARKS

In the Office Action, the Examiner withdrew claims 39 – 44 and 49 – 56 as directed to a non-elected species, approved the drawing correction, rejected claims 33 and 45 under the first paragraph of section 112, rejected claim 31 as anticipated by Shinohe et al., rejected claims 16, 20 – 23, 25 – 20 (sic), 32 – 38 and 45 – 48 as obvious over Shinohe et al in view of Hshieh et al.

Withdrawn Claims

The claims directed to the non-elected species have been marked as (Withdrawn).

35 USC 112, 1st ¶

The Examiner's attention is directed to page 8, last paragraph, where the guard rings 15 are described as lightly p-doped and are floating. This is indicated in Figure 1 as p⁻ to show the light p doping.

The inter-ring zones 16 are described in the first full paragraph on page 9, as typically though not necessarily the same dopant concentration at the sub-base doping, that is the inner zone 2. The inner zone 2 is described on page 6, line 14, as n-doped and has an adjacent heavily n-doped drain zone 4 (if the device is a MOSFET). The drawings show the heavily doped drain zone as p⁺, while the inner zone 2 and inter-ring zones 16 are both indicated as p⁻ to show light doping. Doping that is neither heavy or light is indicated in the drawing without the superscript symbol. Thus, the person of skill in the art would recognize that the inter-ring zone 16 is lightly doped.

Thus, there is support in the disclosure for the claimed subject matter and claims meet the requirements of the first paragraph of section 112.

35 USC 102(b)

Applicants respectfully submit that the Shinohe et al reference does not disclose the effect of totally depleting the free charge carriers in the edge termination structure when a blocking voltage is applied.

While the reference and especially Figure 12 of Shinohe is “similar” to the figures shown in the present patent application, nevertheless, Shinohe is not disclosing at all the precise design rule to predetermine conductivity and geometry of the respective zones in the edge termination structure.

Applicants submit that the edge termination structure shown by Shinohe is different to the edge termination structure of the present invention. Furthermore, Shinohe does not disclose in the reference when considered as a whole any design rules for attempting the effects of an edge termination structure according to the present invention. Instead, Shinohe shows an edge termination structure with floating guard rings as described in detail in a standard semiconductor physics like in the textbook of Baliga.

In the present invention, as defined by the claims presented herein, it clear that the conductivity and geometry have to correspond simultaneously to the effect of a total depletion when a blocking voltage is applied. It is insufficient to fix a conductivity and combine this fixed conductivity with an arbitrary geometry. On the contrary, it is insufficient too to fix a geometry and to combine this fixed geometry with an arbitrary conductivity. The claims, in particular claims 16, 31 and 32 define the invention to provide that a conductivity and a geometry in the edge termination structure is provided which together result in the effect of total depletion.

The prior art to Shinohe does not disclose this feature and so the claims are not anticipated by the cited prior art reference.

35 USC 103(a)

The addition of the Hshieh reference does not result in a teaching or suggestion of the claimed difference over the art. In particular, the claims provide that the invention has conductivities and geometries set such that their free charge carriers are totally depleted when a blocking voltage is applied.

The claimed invention is non-obvious over the cited art.

Conclusion

Favorable reconsideration and allowance of the present application is hereby respectfully requested.

Respectfully submitted,



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